

DOCUMENT RESUME

ED 454 287

TM 033 031

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TITLE Class-Size Reduction Evaluation, 1999-2000. A Report to the North Carolina Department of Public Instruction.
INSTITUTION Wake County Public School System, Raleigh, NC. Dept. of Evaluation and Research.
REPORT NO WCPSS-E&R-01.15
PUB DATE 2000-12-00
NOTE 10p.
AVAILABLE FROM For full text: <http://www.wcpss.net/evaluation-research>.
PUB TYPE Reports - Evaluative (142)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Academic Achievement; *Class Size; Educational Change; Federal Aid; Primary Education; Program Implementation
IDENTIFIERS North Carolina; *Wake County Public School System NC

ABSTRACT

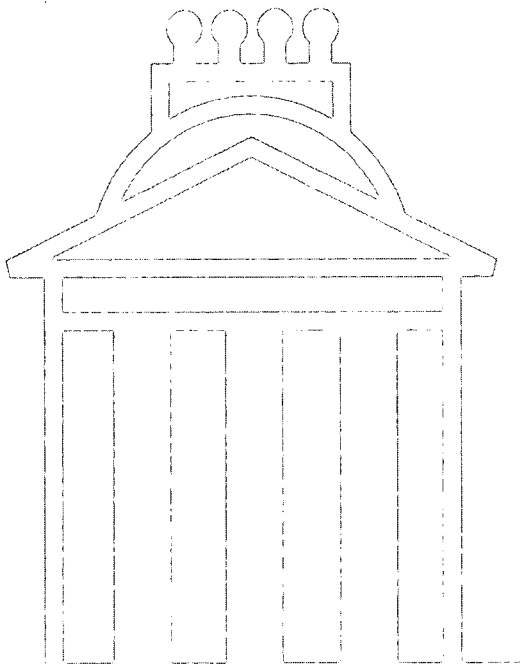
The effectiveness of the Wake County Public School System (WCPSS), North Carolina, plan to reduce class size was evaluated, assessing program implementation and the effects of class size reduction on academic achievement. For the 1999-2000 school year, North Carolina received federal funds targeting class size reduction under the Class Size Reduction Program (CSRP), and an allocation was made to the WCPSS of approximately \$1.1 million. The objective was approached by hiring as many fully qualified teachers as possible, establishing implementation models, and determining the grade levels to target. Twenty-three teachers were supported by CSRP funds, and they were sent to 23 schools where between 21.6 and 51.1% of students received free or reduced-price lunches and between 50 and 117 students per school were considered low-achieving. District staff developed four implementation models, and schools were asked to implement class size reduction in grades 1 or 2, with the preferred model being the introduction of a new class of about equal size to other classes in the target grade. Reduced class sizes thus affected about 2,473 students. Students did show improvement in academic achievement, with improved growth greatest where class size was smallest. However, low-income students appeared to benefit less from class size reduction, even though their achievement improved to some extent. Some departures from the implementation plan were found, and some suggestions are presented for better implementation in the next school year. (SLD)

A Report to the North Carolina Department of Public Instruction

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CLASS-SIZE REDUCTION EVALUATION 1999-2000

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Report No. 01.15
Department of Evaluation and Research
December 2000

TM033031

**A Report to the
North Carolina Department of Public Instruction**

**CLASS-SIZE REDUCTION EVALUATION
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Author: David F. Scudder, Ph.D.
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EXECUTIVE SUMMARY

Small classes have always had an intuitive appeal for parents. To many, it seems obvious that smaller classes should be associated with greater achievement. Still, all other things remaining equal, small classes are more expensive than large classes. Recent research suggests that smaller classes actually do significantly improve achievement. This report examines these and other important issues as they relate to the first year of the federal **Class-Size Reduction Program (CSRP)** in the Wake County Public School System (WCPSS).

Purpose

The evaluation had three main purposes:

- Assess the implementation of the initial year of federally funded efforts to reduce class sizes in WCPSS and the extent to which class sizes were reduced.
- Evaluate the extent to which the amount of class-size reduction achieved is improving the achievement of students in the district.
- Communicate the importance and the results of the program to parents, the public, state government, and ultimately the federal government.

Background

The U.S. Congress authorized the CSRP in 1999 under section 310 of Public Law 106-113. It is the most recent development of the unprecedented interest over the last 15 years in school reform to improve the quality of the nation's public schools. The purpose of the CSRP was to put 100,000 new and fully qualified teachers into America's public schools in order to reduce class size to a national average of no more than 18 in grades one through three. The CSRP is based on a body of high quality experimental research, including Tennessee's Project STAR, which demonstrated that substantial reductions in class size have a significant effect on improving student achievement.

For 1999-2000 the U.S. Congress allocated \$1.2 billion for the CSRP, enough for about 30,000 initial teaching positions nationwide. North Carolina received approximately \$24.7 million for the 1999-2000 school year. School district allocations were based on the number of children in poverty (80 percent) and total enrollment (20 percent). The allocation for WCPSS was approximately \$1.1 million for the 1999-2000 school year.

The objective of the WCPSS implementation plan was to reduce class sizes within targeted schools. In order to accomplish this overall objective, several specific activities were required:

- Hire the maximum number of fully qualified teachers possible with the available funding.
- Determine which schools would receive the new teachers.
- Establish implementation models for deploying the new teachers from among which participating schools could choose.
- Determine which grade levels to target.

Evaluation Questions

Four general evaluation questions are addressed in this report:

- 1) What services were provided?
- 2) Was the program implemented as planned and, if not, why?
- 3) What were the effects of the program?
- 4) How could the program be improved?

Implementation Plan

District staff determined that 23 teachers could be supported through the CSRP funds. The 23 schools with the most need in terms of three indicators were invited to participate.

- Percent of students receiving free- or reduced-price lunches
- Number of students whose academic achievement was below grade level
- Percent of students whose academic achievement was below grade level

These 23 schools had between 21.6 and 51.1 percent of their students receiving free- or reduced-price lunches. They also had between 50 and 117 low-achieving students, which represented between 25.8 and 43.9 percent of the students in the school.

The schools that were invited were:

Brentwood	Farmington	Lockhart	Vandora
Brooks	Fox Rd.	Rand Rd	Wendell
Carver	Fuquay	Rolesville	Wake Forest
Cary	Hodge Rd.	Smith	Willow Springs
Conn	Knightdale	Swift Creek	Zebulon
Creech Rd.	Lincoln	Vance	

District staff developed four implementation models that reflected the national guidance document. Models 1 and 2 involved adding an additional classroom and Models 3 and 4 involved having an additional teacher rotate to team with the regular teachers at a grade level (see next section for details). District staff recommended the selection of Model 1 unless adequate space was not available for an additional classroom. Schools were also asked to implement class-size reduction (CSR) in grades 1 or 2 (national guidance allowed grades 1-3 except in special circumstances, where grades 4-8 were allowed).

Actual Implementation

All 23 of the invited schools chose to participate. All returned the required form in the fall showing that they were implementing one of the available models in an appropriate grade. However, spring questionnaires from the teachers listed as CSR revealed unanticipated implementation issues at some schools. These related to grade levels in which CSR actually occurred and the models selected at some schools (see next section for details).

District staff followed up with the principals immediately to clarify the exact nature of the problems, reported exceptions to the state coordinator, and has since implemented new procedures to avoid similar problems in the current fiscal year.

Services Provided

Students were served in different target grades and by several implementation models. As depicted below, Model 1 (the preferred model) and the second grade were selected most often. However, the table also illustrates that five schools, sometimes unintentionally, reduced class sizes in kindergarten or the third grade, which were not within the WCPSS guidelines (grade 3) or the federal statute (kindergarten) for the 1999-2000 year.

Frequency for Each Implementation Model and Grade Level

Implementation Model	Kindergarten	Grade 1	Grade 1-2 Combined	Grade 2	Grade 2-3 Combined	Total
1. Teacher of new class about equal in size to all other classes of the target grade	4	2	0	8	0	14
2. Teacher of new class substantially smaller than other classes of the target grade	0	3	1	1	1	6
3. Rotating teacher shared equally among all of the classes of the target grade.	0	0	0	3	0	3
4. Rotating teacher shared equally among some of the classes of the target grade	0	0	0	0	0	0
Total	4	5	1	12	1	23

One additional problem was observed as a result of the evaluation. The three schools that selected model 3 did not use the team teaching approach suggested in the guidance document. Instead, at-risk students were pulled out to receive tailored instruction (which was not the intention of the federal or local guidelines). The principals firmly believed they were doing what was in the best interest of the students. District staff informed them this was not an allowable use of these funds and that the research literature does not generally support this practice. None of the schools are using this approach in the 2000-2001 school year.

A further area of concern involved the implementation of Model 2. Some of the schools that adopted Model 2 used the substantially smaller class to target at-risk students. Although this was not prohibited, it was not expected. It was expected that students in the substantially smaller classes in Model 2 would have the same heterogeneity of regular classes.

The 23 teachers hired under the CSRP enabled reduced size classes to be offered to 2473 students as of the 20th day of the school year; about 107 students per teacher hired. As depicted in the next table, the number of students served in each implementation model and grade level mirrored the number of students in the targeted grade levels.

Number of Students Served for Each Implementation Model and Grade Level

Implementation Model	Kindergarten	Grade 1	Grade 2	Grade 3	Total
1. Teacher of new class about equal in size to all other classes of the target grade	485	166	840	0	1491
2. Teacher of new class substantially smaller than other classes of the target grade	0	339	227	121	687
3. Rotating teacher shared equally among all of the classes of the target grade.	0	0	295	0	295
4. Rotating teacher shared equally among some of the classes of the target grade	0	0	0	0	0
Total	485	505	1362	121	2473

As depicted below, the amount of CSR achieved varied by implementation model, with the most reduction achieved under Model 1 and the least under Model 3.

Class-Size Reduction Achieved for Each Implementation Model

Model	Students Served	Average Before	Average After	Average Reduced
1	1491	24.05	19.62	4.45
2	687	26.08	21.46	4.59
3	295	24.58	22.42	2.17

Adding one teacher to each grade level did not result in the achievement of classes of the size recommended by the experimental research literature (12-15) or the enabling legislation (18) because the average class size before adding the additional teacher exceeded 23. In order to reduce the average class size for each student to 18 in grades K-3, at least one and often two teaching positions would have to be added per grade level using Model 1. Careful attention to the total number of students in each grade in each school would be required to keep class sizes from drifting well above the target of 18 in many schools.

While most of the 23 participating schools had space to create one additional class, they would not have had the space to create one or even two additional classes for each grade level; at least not without re-designing the existing spaces for more classrooms with fewer students.

Impact on Academic Growth

Students that received CSR services under Model 1 showed substantial improvements in academic growth over the comparison students. Improved growth was greatest where class size was smallest. First-grade students showed greater improvement in growth due to smaller classes than did second-grade students. These results appear to parallel the results of the experimental Tennessee Project Star, which randomly assigned students to small and regular classes. Students that received CSR under Models 2 or 3 did not show improvement in academic growth over comparison students.

Students in the first grade under Model 2 actually tended to grow less than their counterparts in the comparison group. These outcomes appear to be due primarily to the fact that the class sizes achieved were not substantially less than the county averages. Overall results for each model and each grade level are summarized below.

Overall Results by Model and Grade Level

Model	Grade	Average Class Size Achieved	Growth Measure—level of:	Pretest Differences: CSR lower or higher	Is Growth Pattern Similar for CSR and Comparison	Significant Difference in Growth: CSR higher or lower	Magnitude of Difference
1	1	18.44	Reading	Lower	No	Higher	+1.6 months
			Book	None	No	Higher	+1.7 months
			Writing	Lower	Yes	None	NA
1	2	20	Reading	None	No	Higher	+1.2 months
			Book	None	Yes	None	NA
			Writing	None	Yes	None	NA
2	1	20.73	Reading	None	Yes	Lower	-1.4 months
			Book	None	Yes	Lower	-1.5 months
			Writing	None	Yes	None	NA
2	2	20.54	Reading	None	Yes	None	NA
			Book	None	Yes	Lower	-1.6 months
			Writing	None	Yes	None	NA
3	2	22.42	Reading	Lower	Yes	None	NA
			Book	Lower	Yes	None	NA
			Writing	None	Yes	None	NA

Analysis could not be conducted for kindergarten students because pretest scores were not available. Results are not presented for third grade students because only one school implemented CSR in that grade as a result of creating a combination class with the second grade.

Students receiving free- or reduced-price lunches, who had low pretest scores, appeared to benefit less from CSR than other students, despite overall improvements in growth due to CSR for students receiving free- or reduced-price lunches. In second grade, these students actually grew less than the comparison group, despite overall improvements in academic growth for these students due to CSR. Different growth patterns for different types of students across different pretest scores are only visible in the context of the analysis of covariance used in this evaluation study.

The results for free- or reduced-price lunch (FRL) students with low pretest scores are a concern, since it would be hoped that these students would benefit more from small classes. Increasing academic growth for FRL students is a central concern for WCPSS. FRL students overall show lower growth rates on statewide (end-of-grade) assessments at grades 3-8 as well. Still, it appears likely that random differences between the comparison students actually selected and the population from which they were drawn account for the pattern found. This issue will be revisited in the analysis for the coming year.

Potential Improvements

Departures from the implementation plan were found in several areas. These ranged from unanticipated use of implementation models, to difficulty determining where and by how much class sizes were reduced, to uneven impacts on improving growth and difficulty ensuring the integrity of comparison groups.

The following improvements have been instituted for the 2000-2001 school year.

- Additional, more specific guidance on the implementation models
- Explicit monitoring of program implementation
- Model 2 and 3 limited to schools that lack space
- Model 2 specified to include a heterogeneous mix of students as in other classes.
- Model 3 specified to use a team teaching approach with half of the class in each group
- Institution of a school-level implementation plan, similar to that required for similar programs, so that schools could map their enrollment by grade, display the number of locally-funded teaching positions assigned to each grade, and highlight the placement of the additional teaching CSR position

The following improvements are likely to be implemented during this year.

- Teacher training on reaching students at all achievement levels
- Specific teacher training on how to implement CSR at all achievement levels

The following potential improvements are under consideration for next year.

- Specific teacher training on reaching FRL students with low achievement scores
- Provide a training workshop for principals and school-improvement teams on data-driven approaches to CSR
- Provide a training workshop for principals and school improvement teams on appropriate placement of extra teaching positions
- Encourage implementations that achieve a class size of no more than 18
- Further encourage the use of Model 1 or discontinue Models 2 and 3
- Ensure that schools most in need of improved academic growth have adequate space for CSR with class sizes of 18.
- More closely monitor enrollment to ensure maximum CSR.
- Ensure that new data systems for the state (NC Wise) include the class size for each student
- Ensure that the initial implementation of CSR is spread relatively evenly across grades K-3 to ensure that the improvement in academic growth it provides can be measured

This summary is being widely disseminated to school system staff, and policy makers. It will also be posted on the department web site (www.wcpss.net/evaluation-research). The complete report is available upon request from the Department of Evaluation and Research.

CLASS-SIZE REDUCTION EVALUATION 1999-2000

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**December 2000
E&R Report No. 01.15**

**WAKE COUNTY PUBLIC SCHOOL SYSTEM
DEPARTMENT OF EVALUATION AND RESEARCH**



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